

# MONTANA CLINICAL COMMUNICATION AND SURVEILLANCE REPORT



Montana Department of Public Health and Human Services  
Chronic Disease Prevention and Health Promotion Program  
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## **CHRONIC KIDNEY DISEASE AND END-STAGE RENAL DISEASE BY PRIMARY DIAGNOSIS IN MONTANA, 2000-2006**

### **WHAT'S INSIDE**

#### **Page 1-11**

Chronic Kidney Disease and End-Stage Renal Disease by Primary Diagnosis in Montana, 2000-2006

#### **Page 11**

##### **Save the Date!**

- Diabetes Professional Conference
- MAADE Fall Conference
- Wyoming 2009 Conference

## **BACKGROUND**

Kidney disease is a costly and growing problem in the U.S. The National Kidney Foundation estimated that 11 percent of the U.S. population has Chronic Kidney Disease (CKD) at some stage<sup>1</sup> (Table 1). Individuals with CKD are at high risk for cardiovascular disease as well as kidney failure.

Management of kidney disease is costly. The total costs of kidney disease to Medicare in Montana alone exceed 96 million dollars according to figures from the U.S. Renal Data System (USRDS).<sup>2</sup>

A recent analysis of hospital discharge data from 1980-2005, released by CDC, showed three worrisome trends.<sup>3</sup> Hospital discharge rates for kidney disease increased over the time period. There was a shift from chronic to acute renal failure as the diagnosis at discharge. There were increasing numbers of discharges listing concomitant diagnoses of hypertension and diabetes. Additionally, data from the Medicare End Stage Renal Disease Program showed that one in ten patients with diabetes being treated for ESRD underwent lower extremity amputation in a year.<sup>4</sup>

This report provides an overview of kidney disease in Montana in comparison to the U.S., using data from United States Renal Disease System, Montana hospital discharge data and data from the National Hospital Discharge Survey (NHDS).

## METHODS

Montana hospital discharge estimates were obtained from the 2000-2006 hospital discharge dataset maintained by the Montana Hospital Association. U.S. hospital discharge estimates were obtained from data collected via the National Hospital Discharge Survey (years 2001-2006), an annual national probability sample survey of discharges from nonfederal, general and short-stay hospitals.<sup>5</sup> International Classification of Diseases, Ninth Revision,

Clinical Modification (ICD-9CM) codes were used to identify diagnoses for diabetes (250.00-250.99), hypertension (401), end-stage renal disease (55.60-55.69, 39.95, 54.98, 585, V420, V451), chronic kidney disease (250.4, 581.81, 584, 586-588, 590, 55.60-55.69, 39.95, 54.98, 585, V420, V451) and non-traumatic lower extremity amputations (84.10-84.18 [exclude: 895.0-897.9]) in both the Montana and U.S. datasets.

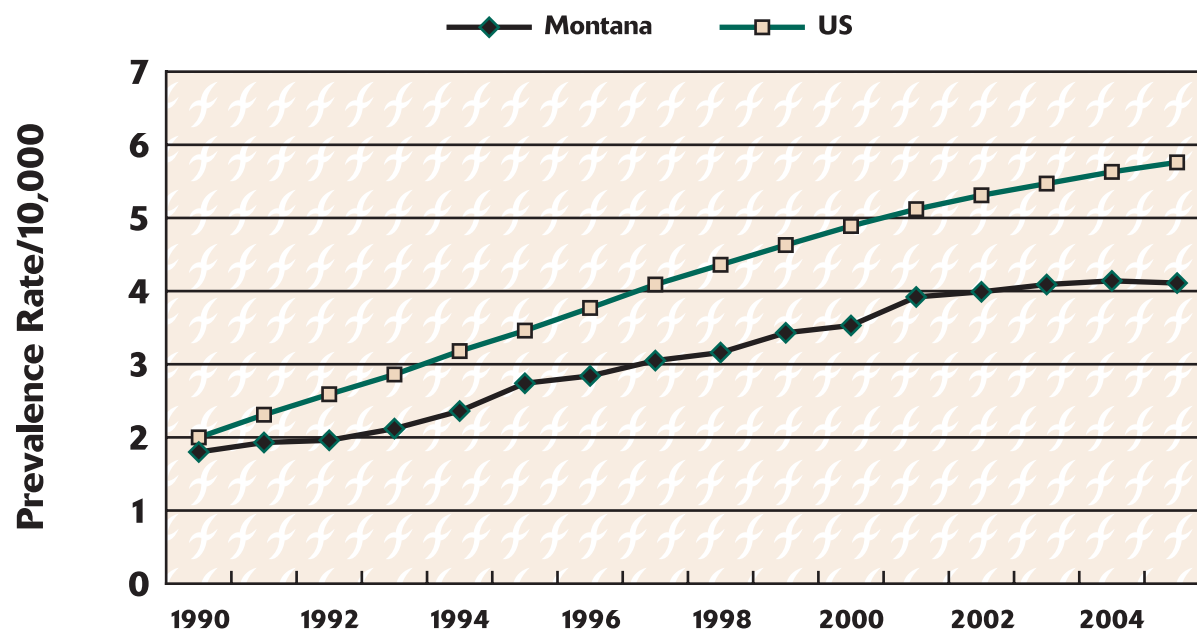
Prevalence estimates of ESRD by primary diagnosis and race were obtained from the USRDS Renal Data Extraction and Referencing (RenDER) System ([http://www.usrds.org/odr/xrender\\_home.asp](http://www.usrds.org/odr/xrender_home.asp)).<sup>6</sup>

Data analyses for Montana were performed using SAS V9.13 (Cary, North Carolina) and

**Table 1: Stages of Chronic Kidney Disease: Definition by Glomerular Filtration Rate (GFR).**

GFR (mL/min/1.73 m <sup>2</sup> )	CKD stage
>90	1
60-89	2
30-59	3
15-29	4
<15	5
Data source: NKF K/DQOI <a href="http://www.kidney.org/professionals/kdoqi/guidelines_ckd/p4_class_g1.htm">http://www.kidney.org/professionals/kdoqi/guidelines_ckd/p4_class_g1.htm</a>	

**Figure 1. Age-adjusted prevalence rates of end-stage renal disease (ESRD) associated with diabetes mellitus, Montana and the US, 1990-2005.**



Data source: U.S. Renal Data System, USRDS 2006 Annual Data Report: Atlas of End-Stage Renal Disease in the United States, NH, NIDDK, Bethesda, MD, 2006.

weighted analyses for the U.S. were performed using SUDAAN V9 (Durham, North Carolina). Due to small numbers of discharges listing lower extremity amputations, CKD/ESRD and diabetes/hypertension, 2000 through 2006 Montana discharge data were concatenated to produce estimates of the prevalence of LEA in people with diabetes-associated and hypertension-associated CKD/ESRD and the prevalence of diabetes-associated and hypertension-associated CKD/ESRD in people with lower extremity amputations. Rates were age-adjusted to the 2000 U.S. standard population where reliable counts were available by age group, discharge and prevalence.

## RESULTS

### Diabetes-associated CKD and ESRD

#### Prevalence of ESRD

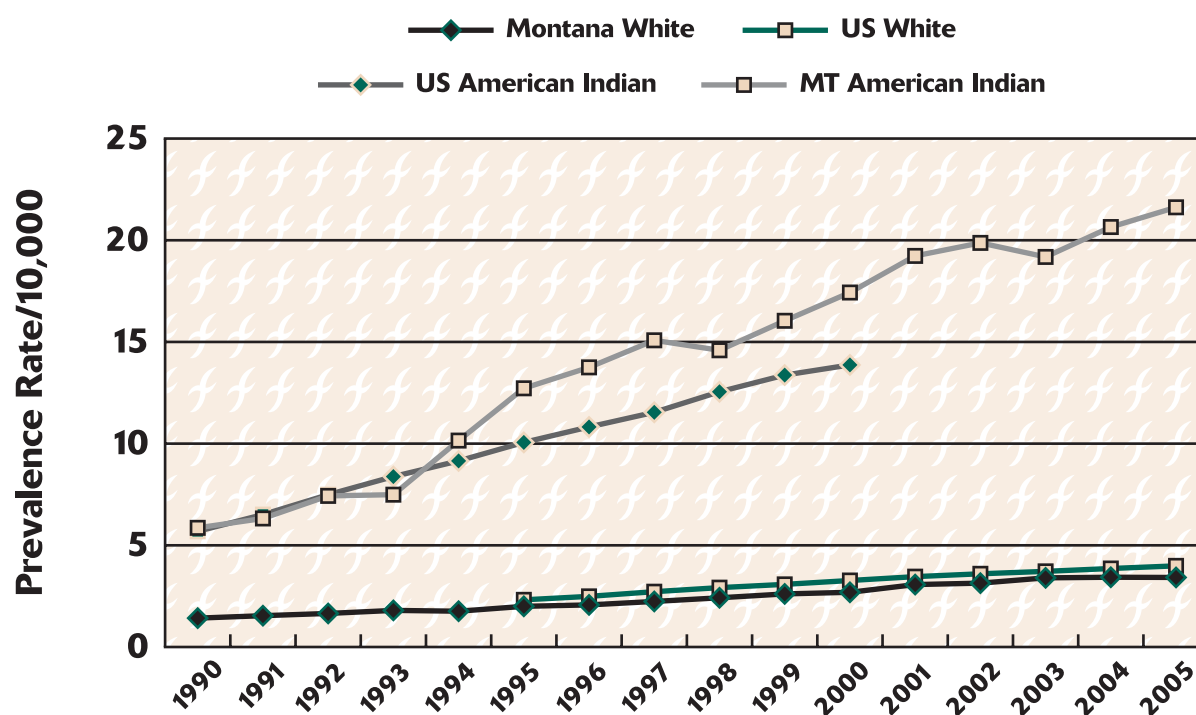
The prevalence rate of diabetes-related ESRD in Montana in 2005 was 4 per 10,000. The Montana prevalence rate was slightly lower than the U.S. rate (6 per 10,000). ESRD prevalence rates in both the U.S. and Montana have increased steadily from 2 per 10,000 in 1990 (Figure 1).

**Table 2: Number and percent of ESRD cases due to diabetes, Montana and the US, 2005.**

	Total Number	Number due to diabetes	Percent due to diabetes
<b>Montana</b>			
New patients <sup>1</sup>	181	81	45%
Existing patients <sup>2</sup>	975	441	45%
<b>US</b>			
New patients <sup>1</sup>	104,767	45,905	44%
Existing patients <sup>2</sup>	477,583	1,762,429	37%

<sup>1</sup>New cases are persons first diagnosed with ESRD during 2005.  
<sup>2</sup>Existing cases are persons living with ESRD as of 12/31/05.  
Source: U.S. Renal Data System, USRDS 2006 Annual Data Report: Atlas of End-Stage Renal Disease in the United States, NIH, NIDDK, Bethesda, MD, 2006.

**Figure 2. Crude prevalence rates of end-stage renal disease (ESRD) associated with diabetes mellitus by race, Montana and the US, 1990-2005.**



Data source: U.S. Renal Data System, USRDS 2006 Annual Data Report: Atlas of End-Stage Renal Disease in the United States, NIH, NIDDK, Bethesda, MD, 2006.

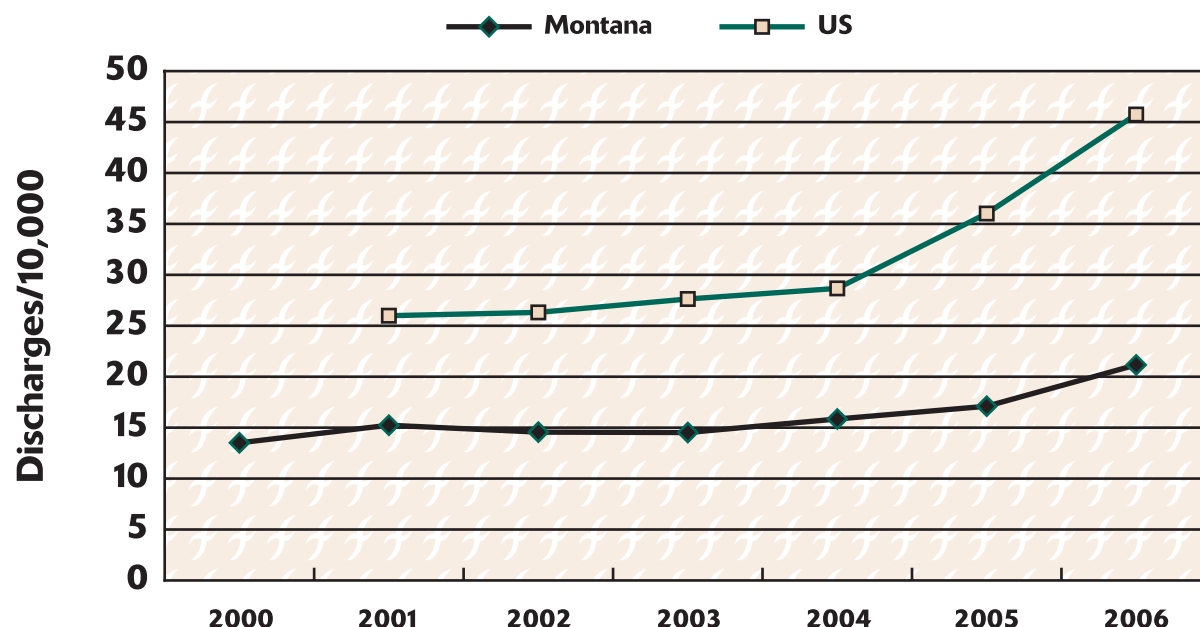
In 2005, 45 percent of all ESRD cases in Montana were attributed to diabetes. The percent of new cases attributed to diabetes in the U.S. was similar to the percent in Montana, but the percent of existing diabetes-related ESRD in the U.S. was lower (37 percent) compared to Montana (Table 2).

### Race

In 2005, the diabetes-associated ESRD prevalence rate in Montana Indians was seven times the rate of whites in Montana (22 per 10,000 in Montana Indians

compared to 3 per 10,000 in Montana whites). The diabetes-associated ESRD prevalence rate in Montana whites was nearly identical to that of U.S. whites in 2005 (3 versus 4 per 10,000, respectively). However, the diabetes-associated ESRD prevalence rate in Montana Indians (17 per 10,000) was higher than the overall U.S. American Indian rate (14 per 10,000) in 2000, the comparable time point (Figure 2). In 2005, Montana Indians contributed 25 percent of all diabetes-associated ESRD in Montana.

**Figure 3. Age-adjusted hospital discharge rates for chronic kidney disease\* and diabetes as any diagnosis, Montana and the US, 2000-2006.**



\*includes ESRD

Data source: Montana hospital discharge data, Montana Hospital Association, 2000-2006  
National Hospital Discharge Data Survey, CDC, NCHS, 2001-2006.

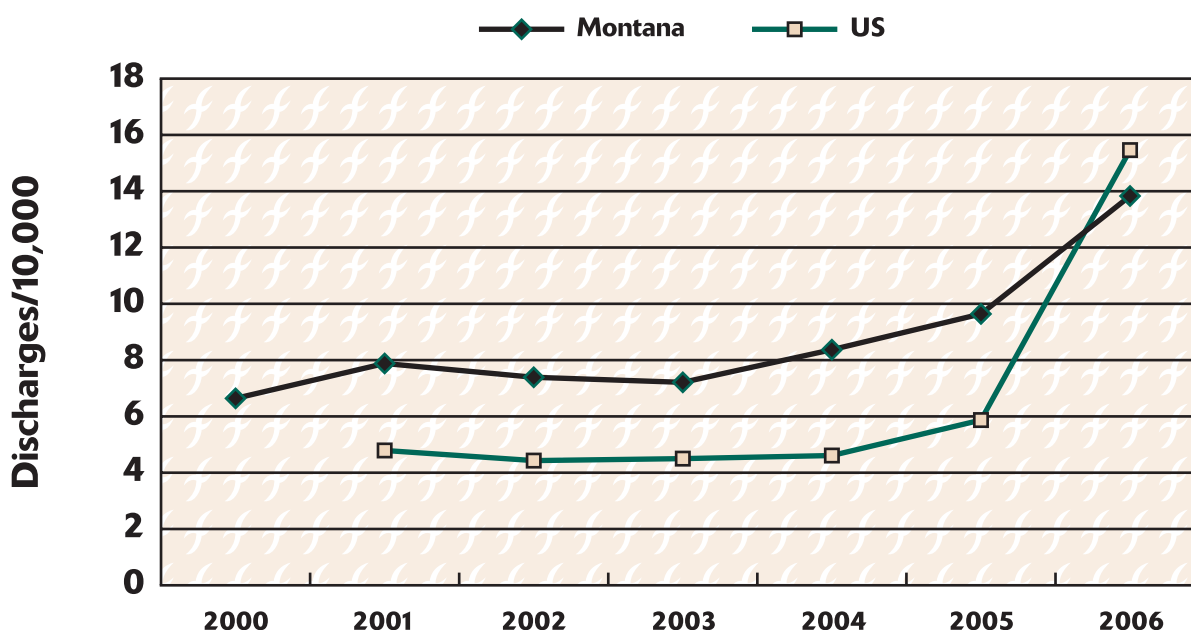
## Hospital discharges

The age-adjusted hospital discharge rate for chronic kidney disease (CKD) with a concurrent diabetes diagnosis was 21 per 10,000 in 2006 (Figure 3). The age-adjusted hospital discharge rate for end-stage renal disease (ESRD) with a concurrent diabetes diagnosis was 14 per 10,000 (the CKD rate includes ESRD) (Figure 4). The trends for both CKD and ESRD discharge rates were flat at approximately 15 and 7 per 10,000, respectively, from 2000 to 2003. But from 2003 to 2006, CKD and ESRD discharge rates increased exponentially. This increase occurred primarily in persons 75 years of age and older and appeared to be related to an increase in heart failure hospitalizations in this group (data not shown).

The U.S. diabetes-associated CKD discharge rate (46 per 10,000) was about twice the Montana rate in 2006. The discharge rate was higher than the Montana rate, at about 27 per 10,000 from 2001 to 2004, then increased exponentially to the 2006 rate (Figure 3). The U.S. hospital discharge rate for diabetes-associated ESRD followed the same trend, but at 5 per 10,000 was lower than the Montana rate from 2001 to 2005. In 2006, the U.S. diabetes-associated ESRD rate (15 per 10,000) surpassed the Montana rate (Figure 4).

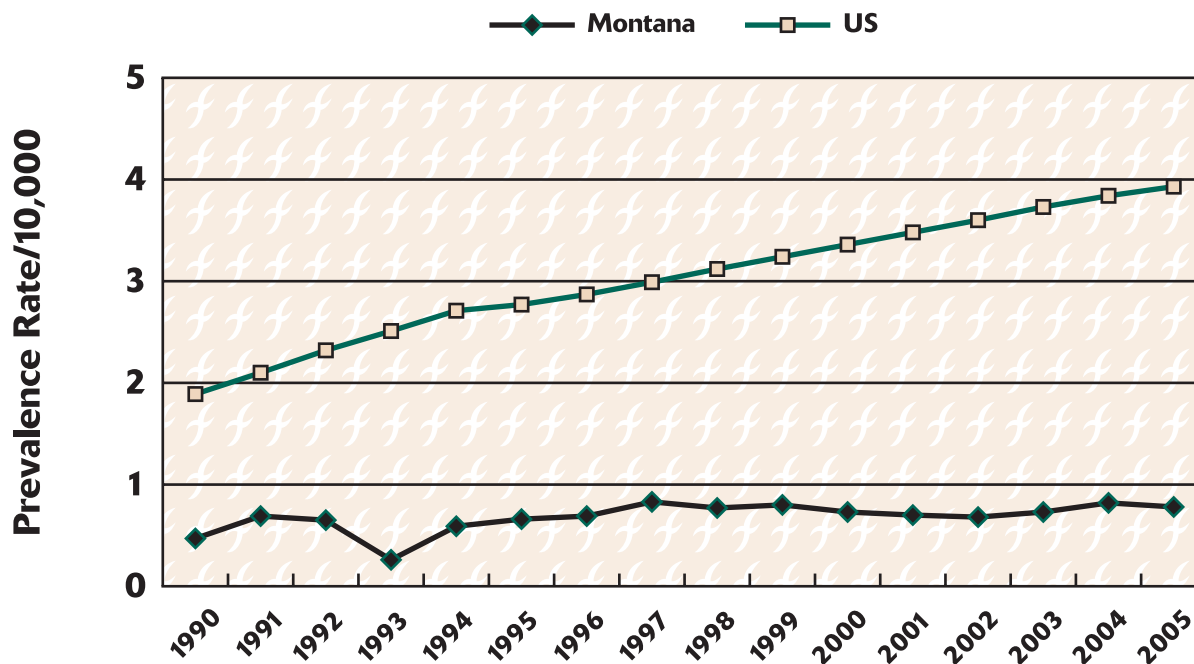
Neuropathy and vascular disease increase the risk of lower-extremity amputations (LEA) in people with diabetes-associated ESRD/CKD. Nearly 5 percent of Montana hospital discharges from 2000 to 2006 listing diagnoses of diabetes and ESRD also listed a LEA.

**Figure 4. Age-adjusted hospital discharge rates for end-stage renal disease and diabetes as any diagnosis, Montana and the US, 2000-2006.**



Data source: Montana hospital discharge data, Montana Hospital Association, 2000-2006  
National Hospital Discharge Data Survey, CDC, NCHS, 2001-2006.

**Figure 5. Crude prevalence rates of end-stage renal disease (ESRD) associated with hypertension, Montana and the US, 1990-2005.**



Data source: U.S. Renal Data System, USRDS 2006 Annual Data Report: Atlas of End-Stage Renal Disease in the United States, NH, NIDDK, Bethesda, MD, 2006.

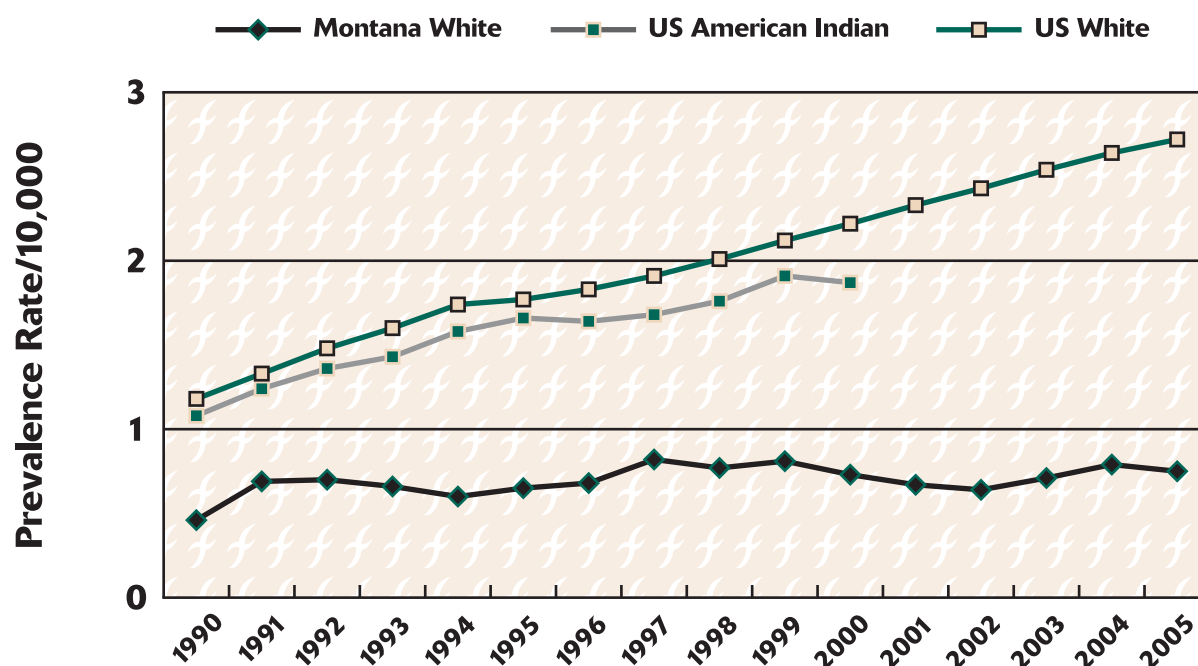
**Table 3: Number and percent of ESRD cases due to hypertension, Montana and the US, 2005.**

	Total Number	Number due to hypertension	Percent due to hypertension
<b>Montana</b>			
New patients <sup>1</sup>	181	19	10%
Existing patients <sup>2</sup>	975	73	7%
<b>US</b>			
New patients <sup>1</sup>	104,767	28,412	27%
Existing patients <sup>2</sup>	477,583	116,438	24%

<sup>1</sup>New cases are persons first diagnosed with ESRD during 2005.  
<sup>2</sup>Existing cases are persons living with ESRD as of 12/31/05.

Source: U.S. Renal Data System, USRDS 2006 Annual Data Report: Atlas of End-Stage Renal Disease in the United States, NIH, NIDDK, Bethesda, MD, 2006.

**Figure 6. Crude prevalence rates of end-stage renal disease (ESRD) associated with hypertension by race, Montana and the US, 1990-2005.**



Data source: U.S. Renal Data System, USRDS 2006 Annual Data Report: Atlas of End-Stage Renal Disease in the United States, NH, NIDDK, Bethesda, MD, 2006.

Alternately, 23 percent of hospital discharges listing a LEA also listed diabetes and ESRD as diagnoses. Thirty-four percent of hospital discharges for LEA also listed diabetes and CKD.

## Hypertension-associated CKD and ESRD

### Prevalence

The prevalence rate of hypertension-related ESRD from 1990 to 2005 in Montana was less than 1 per 10,000. The U.S. prevalence rate in 2005 was higher than the Montana rate; 4 per 10,000, increasing steadily from 2 per 10,000 in 1990 (Figure 5).

Ten percent of new cases and 7 percent of existing cases of ESRD in Montana were attributed to hypertension. The percent of both new and existing ESRD cases attributed to hypertension is much higher in the U.S. (27 percent and 24 percent) compared to Montana (Table 3).

### Race

In contrast to diabetes-related ESRD, from 1990 to 2005, whites contributed to nearly all (95 percent) of the hypertension-related ESRD burden in Montana. Due to extremely small numbers, hypertension-related ESRD could not be estimated in



Montana Indians. The U.S. American Indian prevalence rate is similar to the general U.S. rate (Figure 6).

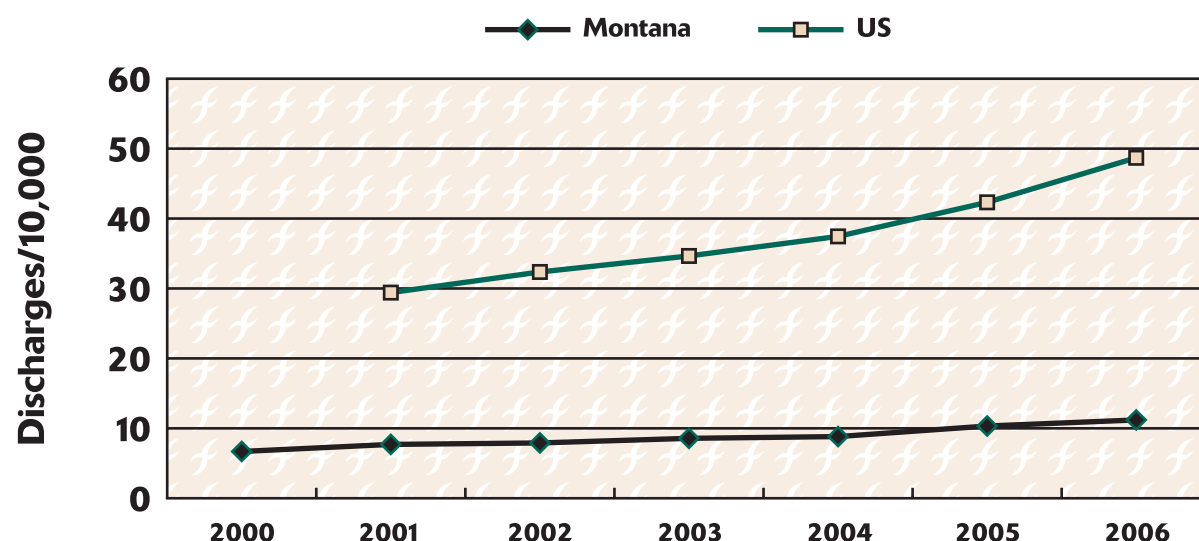
## Hospital discharges

The age-adjusted discharge rate for chronic kidney disease with a concurrent diagnosis of hypertension for Montana in 2006 was 11 per 10,000. This rate increased steadily from 7 per 10,000 in 2000 to the 2006 rate. The U.S. discharge rate for hypertension-related CKD has consistently been about four times higher than the Montana rate. In 2006, the U.S. discharge rate for CKD and hypertension was 49 per 10,000, increasing steeply from 29 per 10,000 in 2001 (Figure 7).

The 2006 rate for hospital discharges listing ESRD and hypertension was 5 per 10,000 in 2006. The rate remained at about 3 per 10,000 during the years 2000 to 2004, increasing slightly in 2004 to 2006. The U.S. discharge rate for hypertension-related ESRD was identical to the Montana rate during the years 2001 to 2005. However, in 2006, the U.S. rate surpassed the Montana rate at 8 per 10,000 (Figure 8).

In contrast to diabetes-associated ESRD, LEAs were not as common in the hypertension-associated ESRD population – about 1 percent of discharges from 2000 to 2006. Only 5 percent of hospital discharges for LEA had hypertension and ESRD listed as additional diagnoses. Four percent of LEA discharges also listed hypertension and CKD.

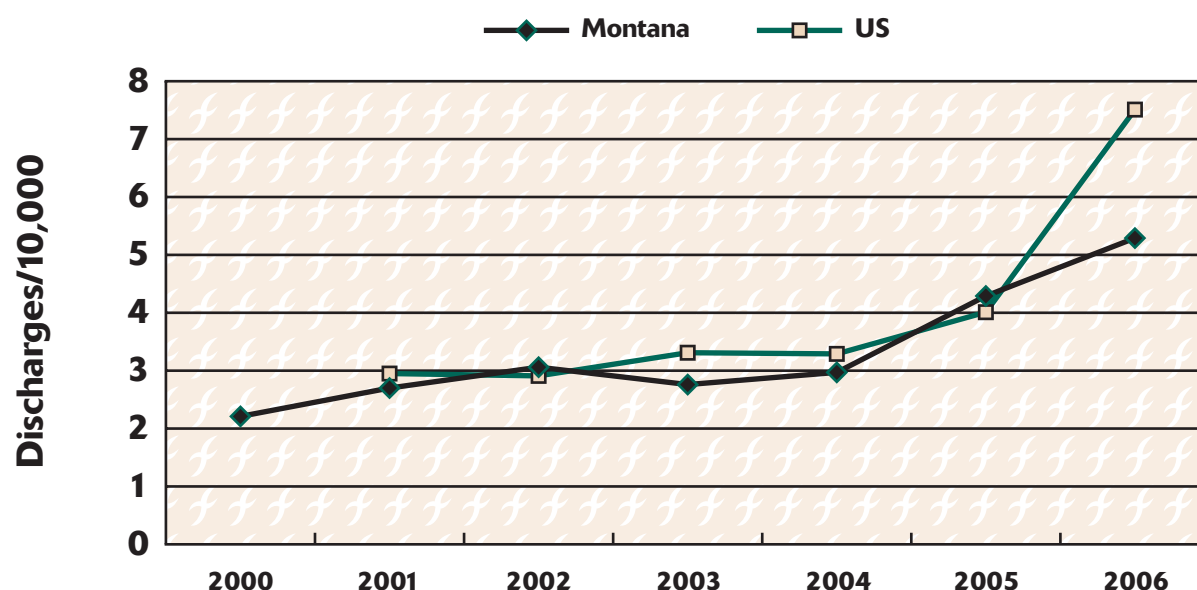
**Figure 7. Age-adjusted hospital discharge rates for chronic kidney disease\* and hypertension as any diagnosis, Montana and the US, 2000-2006.**



\*includes ESRD

Data source: Montana hospital discharge data, Montana Hospital Association, 2000-2006  
National Hospital Discharge Data Survey, CDC, NCHS, 2001-2006.

**Figure 8. Age-adjusted hospital discharge rates for end-stage renal disease and hypertension as any diagnosis, Montana and the US, 2000-2006.**



Data source: Montana hospital discharge data, Montana Hospital Association, 2000-2006  
National Hospital Discharge Data Survey, CDC, NCHS, 2001-2006.

## CONCLUSIONS

The prevalence of ESRD and hospital discharge rates for ESRD and CKD have increased in Montana and the United States. Diabetes was more commonly associated with ESRD than hypertension in Montana. Montana Indians contributed substantially to the prevalence of diabetes-associated ESRD, but very little to the prevalence of hypertension-associated ESRD. Additionally, Montana Indians had a higher rate of diabetes-associated ESRD than the overall American Indian population in the United States.

Hospital discharge rates for diabetes-associated CKD and hypertension-associated CKD were much lower in Montana than the U.S. The Montana hospital discharge rate for hypertension-associated ESRD was nearly identical to the U.S. discharge rate. The Montana

discharge rate for diabetes-associated ESRD was higher than the U.S. rate for all years except 2006, probably due to the relatively large percentage of American Indians in the Montana population. Lower-extremity amputations were common in the diabetes-associated ESRD population, but less common in the hypertension-associated ESRD population in Montana.

To address the increasing burden of ESRD and CKD in Montana, The Montana Diabetes Project is partnering with the Mountain-Pacific Quality Health Foundation to improve the rate of screening for nephropathy in patients with diabetes and to increase the number of patients with diabetes and hypertension who are on an angiotensin converting enzyme inhibitor (ACE) or angiotensin receptor blocker (ARB). Activities related to this important project will begin in the coming months.

## REFERENCES

- <sup>1</sup> National Kidney Foundation: K/DOQI Clinical practice guidelines for chronic kidney disease: evaluation, classification and stratification. *Am J Kidney Dis* 2002; 39 (suppl):S1-266
- <sup>2</sup> USRDS 2007 Annual Report Chronic Kidney Disease: CKD populations and costs Table 1.a page 67
- <sup>3</sup> Flowers NT, Croft JB. Hospital Discharge Diagnoses for Kidney Disease – United States, 1980-2005. *MMWR* 2008;57:309-12
- <sup>4</sup> Eggers PW, Gohdes D, Pugh J. Nontraumatic lower extremity amputations in the Medicare end-stage renal disease population. *Kidney International* 1999; 56: 1524-1533
- <sup>5</sup> Centers for Disease Control and Prevention, National Center for Health Statistics, National Discharge Data Survey, 2001-2006, <http://www.cdc.gov/nchs/about/major/hdasd/nhds.htm#Hospital%20Discharge>
- <sup>6</sup> United States Renal Disease System, National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, <http://www.usrds.org>

## SAVE THE DATE

### **DIABETES PROFESSIONAL CONFERENCE “EXPLORING NEW FRONTIERS IN DIABETES, 2008”**

**OCTOBER 23-24, 2008**

Holiday Inn, Bozeman, Montana

For more information,

call Susan Day at 406-444-6677

or go to [www.diabetes.mt.gov](http://www.diabetes.mt.gov)

### **MAADE FALL CONFERENCE**

**OCTOBER 23, 2008**

Holiday Inn, Bozeman, Montana

For more information,

call Mary Lou at 406-259-9629

### **WYOMING 2009 CONFERENCE DIABETES & HEART DISEASE**

**“PUTTING IT ALL TOGETHER”**

**MAY 7-8, 2009**

Ramada Inn, Casper, Wyoming

For more information,

call Marianne at 307-777-8604

## WHAT ARE THE MONTANA DIABETES PREVENTION AND CARDIOVASCULAR HEALTH PROGRAMS AND HOW CAN WE BE CONTACTED?

The Montana Diabetes Control and Cardiovascular Health Programs are funded through cooperative agreements with the Centers for Disease Control and Prevention, Division of Diabetes Translation (U32/CCU822743-05), the Division for Heart Disease and Stroke Prevention (1U50 DP000736-01) and through the Montana Department of Public Health and Human Services.

The mission of the Diabetes Control and Cardiovascular Health Programs is to reduce the burden of diabetes and cardiovascular disease among Montanans. Our web pages can be accessed at <http://www.diabetes.mt.gov> and <http://montanacardiovascular.state.mt.us>.

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